DISTRIBUTION OF IMPACT-INDUCED STRESS AROUND LONAR CRATER, INDIA. Md. Arif[1], S. Misra[1], N. Basavaiah[1] and H. Newsom[2]. [1]Indian Institute of Geomagnetism, Navi Mumbai- 410218, India. E-mail: mdarifkrl@gmail.com. [2]Institute of Meteoritics, University of New Mexico, NM- 87131, USA.

Introduction: The 52±6 ka old Lonar crater, India [1, 2], is the only known terrestrial impact crater in basaltic target-rocks (Deccan Traps, ~65 Ma). The impactor asteroid of this ~1.8 km diameter crater was perhaps a chondrite [3] that hit the pre-impact surface from east at an angle of 30-45^{o} with horizon [4]. Presently, we report the possible distribution of impact-induced stress around Lonar crater using Anisotropy of Magnetic Susceptibility (AMS) technique and also variations in Natural Remanent Magnetization (NRM) with reference to the direction of impact.

Experimental Procedures: Oriented drill cores of shocked basalts and apparently unshocked basalts were collected from all around the crater rim and at ~2 km east from the crater rim respectively. The AMS measurements were carried out by an AGICO KLY-4S Kappabridge instrument with an alternating field intensity of 300 Am^{-1} and operating frequency of 875 Hz. The NRM was measured by a Molspin Spinner Magnetometer.

Results: The K_3 axes of AMS of shocked basalts collected from the eastern, southeastern, and northern sectors along the crater rim show a major westward shift. A southwest-ward shift of K_3 axes is noticed for shocked basalts from the southern and southwestern sectors of the crater rim, and for samples from near the Kalapani dam and Khini village situated at ~2 km WSW of crater. The samples from west-northwest and northwest sectors of crater rim and from the Saraswati village, ~2 km NW of crater, show a major northwest-ward shift of K_3 axes. The unshocked basalts ≥2 km away from crater rim have an average NRM of ~5 Am^{-1}. The shocked basalts from Kalapani dam, however, show a lower NRM of an average of ~2.6 Am^{-1}. The shocked basalts from western sector of crater rim show a relatively high NRM with an average of ~11 Am^{-1} whereas those from other sectors show NRM between ~4-6 Am^{-1}, which are closed to that of the unshocked basalts. A few shocked basalts from eastern half of crater rim including N, E, SE and S sectors occasionally show a very high NRM between ~70 and 360 Am^{-1}.

Discussions: The general westward shift of K_3 axes of AMS of shocked basalts around crater rim indicates an impact-induced stress from the east when compared with experiments [5]. This finding is consistent with our early observations on ejecta distribution and structural analyses of basalt flows around the crater rim [4]. The major SW- and NW- ward shifts of K_3 axes in the S, SW, and WNW and NW sectors of crater respectively indicate a possible branching of impact stress in the downrange direction at an angle of ~45^{o} with east-west plane of impact. The NRM values of shocked basalts show systematic distribution around crater rim. The values are abnormally high in cases along eastern half of the crater rim in uprange direction, while values become lower along one of the directions of major branching of impact-stress in SW. Present study shows that impact-stress may result systematic decrease and increase of NRM of target rocks.

References: [1] Fredriksson et al. 1973. *Science* 180:862-864. [2] Sengupta et al. 1997. *Revista de Fisica Aplicada e Instrumentacao* 12:1-7. [3] Misra et al. 2008. *Meteoritics and Planetary Sciences* (in press). [4] Misra et al. 2006. *37th Lunar and Planetary Science Conference*, abs. no. #1085. [5] Nishioka et al. 2007. *Earth Planets Space* 59:e45-e48.